Introduction

Within the last 5-10 years, the idea of barefoot running has exploded in the world of running and has begun to influence the casual runner as well. The concept has become increasingly popular as runners continue to identify what they believe are problems with shod running, mainly the notion that modern running shoes force the runner to adopt a heel-strike pattern which causes overwhelming stress on the lower leg bones and joints (9). The United States Army is experiencing this firsthand in its basic training, as one of the leading causes of injury for female soldiers is hip fracture, assumed to be caused by high amounts of running and carrying heavy loads. Many researchers and barefoot runners would infer that the increase in stress fractures in the tibia and hip amongst runners is caused by the forced heel-strike running pattern. Proponents of barefoot running argue that the lack of foot protection does not promote further injury, but may actually help prevent injury by promoting a mid-foot strike pattern that disperses the force of the impact instead of centralizing the impact on the bones and joints of the lower leg. (10). It has also been suggested that barefoot training increases performance and economy of running. Because of the increasing popularity of barefoot running and the claims made by its proponents, it is important to understand the effects of this type of training. The purpose of this study is to identify any correlations between barefoot training and our tested variables, in order to determine if this training increases athletic performance substantially over normal shod training.

Conclusion

After the 4 week training program, only CMJ max height showed a significant difference (p=0.047) between the two groups. Although the groups showed slight increases or decreases in the other variables tested, there was no other statistically significant differences between the experimental and control groups. There are several inferences that can be made from these findings. In regards to CMJ max height, which was used as an indicator of vertical jump height, the experimental group showed no change, while the control group improved significantly. One reason for this difference could be the psychological mindset of the athlete training barefoot and fearing injury from a lack of support and protection during jump and high-intensity training.

Within this study, there were no statistically significant differences between the barefoot and shod conditions in experienced barefoot runners. Differences were found between the experimental and control groups in terms of VO2 max (W), plyo contact time (ms), stiffness (kN/m), CMJ max power (W), CMJ CON/ECC power ratio, oxygen cost of running (W/kg ∙ min), 85% VO2 max (mLO2/kg ∙ min), and 50% VO2 max (mLO2/kg ∙ min) (CMJ), plyometric jump test (Plyo), and a metabolics test up to 85% of predicted VO2 max. The difference in the experimental and control groups in this study, however, was not statistically significant.

Methods

14 Male cadets from the University of Minnesota Twin-Cities Army ROTC program were recruited to participate in this study. Two groups of 7 subjects were established, the experimental group receiving barefoot training and the control group receiving shod training. Several pre-tests were conducted including a metabolic test (Oxygen mobile) up to 85% of predicted max heart rate, a half-squat profile, a countermovement jump, and a plyometric jump test. The subjects wore their regular athletic footwear during testing. A 3D accelerometer (Myostat, Switzerland) was utilized to record power, force, velocity, and ground reaction force. After pre-testing, the subjects underwent the 4 week training program. Subjects were trained 3 days a week using high-intensity and run interval training that was part mimicked how subjects had been trained using military physical fitness training. Training also included countermovement and plyometric jump training, box training, and various Olympic lifting protocols. The experimental group conducted all training barefoot, while the control group remained shod. Post-testing was conducted after the 4 week training period. Statistics were collected using SPSS analytic software. This sentence needs specificity, either explain or move results.

Acknowledgments

A special thank you to the University of Minnesota Twin-Cities Army ROTC for committing their time and cooperation in participating in this study.

References


Abstract

 Purpose: The purpose of this study was to identify any relation between barefoot training and leg power production as well as running economy, in order to determine if this training increases athletic performance substantially over normal shod training.

Methods: 14 Male participants (age 21±1 year) were recruited from the University of Minnesota Army ROTC program. They were split into an experimental (n=7) and a control group (n=7). The experimental group received barefoot training, while the control group received normal shod training. Pre- and post-testing consisted of a half squat profile (HS Profile), countermovement jump test (CMJ), plyometric jump test (Plyo), and a metabolics test up to 85% of predicted HRmax. A 3D accelerometer (Myostat, Switzerland) was utilized to record power, force, velocity, and ground reaction force. In between testing, the subjects trained 3 days a week for 4 weeks on lower body power/strength, interval run training, and jump training.

Results: Repeated independent t-tests were performed to determine significance (p<0.05) between the control and experimental groups. Variables measured were 85% VO2 max (mLO2/kg ∙ min), pulmonary ventilation (VE), HS profile power max (W), plyo contact time (ms), stiffness (kN/m), CMJ max power (W), CMJ CON/ECC power ratio (W), and CMJ max height (cm). All variables tested yielded no significance between pre- and post-test results for either group, except for CMJ max height (p=0.050), in which the barefoot group showed significantly less improvement than the shod group.

Conclusion: Metabolic and leg power production results revealed that there was no significant difference between the barefoot and shod groups in all variables except CMJ max height. The barefoot training group experienced no change in max height while the shod group training slightly increased. This study provided evidence that acute barefoot training does not significantly affect overall athletic performance.

ACUTE EFFECTS OF BAREFOOT TRAINING ON LEG POWER PRODUCTION AND METABOLICS IN A MILITARY POPULATION

Aaron Phelps and Kyle Terhark

Department of Human Kinetics and Applied Health Sciences
The Biokinetics Program